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The New Trade Protection

Price Effects of Antidumping and Countervailing Measures in the United States

Ann Harrison

For some sectors the effect on import prices of investigating antidumping cases and countervailing measures is as great as imposing a duty. And investigations that end in duties have different effects than those resulting in no action.

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The frequent application of antidumping and countervailing measures in the United States in the 1980s has been described as a new form of protection.

Harrison measures the effect not only of investigations (to evaluate claims of dumping or subsidies) but of the resulting duties, by measuring their impact on import prices.

The dataset combines cross-section and time series data for 1981-86, making it possible to control for differences across industries and separately measure the effects of duties and investigations.

The results suggest that for some sectors the price effect of investigations is as great as imposing a duty. Investigations that end in duties have different effects than those resulting in no action.

The New Trade Protection:
Price Effects of Antidumping and Countervailing Measures in the United States

by
Ann Harrison*

Table of Contents

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I. Introduction

Several rounds of trade negotiations over the last three decades have reduced the level of tariffs in the United States to an average of 6 percent. At the same time, however, ceilings on tariffs have been accompanied by significant increases in non-tariff measures. Although some of these forms of protection, such as quotas or voluntary export restraints, have clearly affected steel and autos, less is known about the effects of other, increasingly popular non-tariff measures: anti-dumping and countervailing investigations and duties. Despite theoretical arguments by Prussa (1988), Dixit (1988), and Staiger and Wolak (1990), the impact of these measures on import prices is not well understood.[1]

Countervailing and anti-dumping measures are generally referred to as "less-than-fair-value" (LFV) cases, where a foreign exporter to US markets is accused of setting the export price below its fair value. The fair value is usually determined to be either the home market price (as in a dumping case) or a constructed price net of subsidies (as in a countervailing duty case). LFV cases are assessed through investigations by the US government, followed by a duty if the foreign firm is indeed found guilty of dumping or receiving subsidies.

Are these measures a new form of protection? None of the previous studies on LFV cases have measured their impact on import prices. [2] Herander and

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[1] For an overview of the stylized facts on antidumping legislation and its effects in the European Community, see Messerlin (1989).

[2] See, for example, Finger (1981), Herander and Schwartz (1986), Hartigan, Perry and Kamma (1989), Salvatore (1987), Leamer (1989), and Messerlin (1989)).

Schwartz (1986), using data for 1976-81, found that dumping margins of individual firms declined following the initiation of an investigation. However, they did not attempt to test whether investigations increased overall import prices for the affected industry. Nor have previous studies compared the impact of investigations with the duties which may (or may not) follow. To properly measure these effects separately would require a time series on the affected product.[3] Finally, there have been no attempts to measure the different impact of investigations conditional on their outcomes. Do investigations which terminate in a duty have a greater effect than others? Prussa (1988) and Staiger and Wolak (1990) suggest that investigations which do not culminate in duties may actually lead to higher price increases than duties. Since petitions for investigations may be withdrawn, collusive agreements between domestic and foreign firms may lead to higher prices even if no duties are imposed.

This paper addresses these empirical questions using a dataset which combines cross section and time series data to create a panel for 41 different product groups over 1981-1986. LFV cases were brought against half the products, creating a control group for comparison. The time series nature of the dataset also makes it possible to separately estimate the effects of investigations and duties. The results suggest that for a number of sectors, import prices increase by as much as 10 percent during an investigation--suggesting that investigating an exporter for unfair pricing behavior may have as powerful an effect on import prices as the duty itself.

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[3] One interesting approach to this problem is taken by Hartigan et al (1989) who use a time series of firm stock prices to measure the impact of anti-dumping investigations and duties on the reported stock value of domestic firms involved in anti-dumping or countervailing duty complaints. However, the impact of anti-dumping investigations and duties cannot be separated in their analysis, since the combined effect of the two is immediately incorporated in the stock value of the domestic firm.

Another interesting stylized fact which emerges is that pricing behavior differs depending on the outcome of the investigation. Across all types of industries, investigations which did not result in duties had no statistically significant effect on import prices. Investigations which did lead to duties, however, were associated with either significant increases in import prices or significant declines. These results suggest that in some cases, the expected duties are incorporated in import prices during the investigation. In other cases, however, it appears that duties are imposed following a period of low prices observed during the investigation.

The theoretical and institutional framework is presented in Section II. We show why the threat of a duty is sufficient to induce firms to raise their prices. Section III describes the dataset and estimation procedure. The results are presented in Section IV.

II. Theoretical and Institutional Framework

It is impossible to understand why firms would be induced to raise prices when they are subject to an investigation without a clear understanding of the institutional framework. [4] Since the procedure for anti-dumping and countervailing duty claims are very similar, we will refer to them interchangeably. A LFV case is first initiated by either the Secretary of Commerce or an "interested party". The interested party is usually a representative for domestic manufacturers of the competing imported product, a

[4] See Section 19 by Wendy Takacs and Section 21 by Morton Pomeranz in Handbook of International Business, Tracy Murray and Ingo Walter, editors, 1987.

union, or a trade association of domestic producers. Within a designated time period, the Commerce Department must reach a preliminary determination about whether the foreign firm is guilty of dumping (or receiving subsidies). If the preliminary determination is positive, then the importing firm must provide a deposit equal to the subsidy or dumping margin for all its imports into the US.

After the preliminary decision, the Commerce Department has an additional period to reach a final determination. If the determination is positive, the International Trade Commission (ITC) must then decide within a designated period whether the product is causing or threatens to cause "material injury" (ie substantial harm) to US firms. If the determination is negative, the foreign exporter is refunded the deposit. If, however, the final determination is positive, then the firm must continue to make cash payments on its exports of an amount equal to the dumping margin or the subsidy. For both dumping and countervailing cases, in "critical circumstances" duties may be imposed retroactively to the beginning of the investigation. In the case of dumping duties, the process may be suspended if an agreement is reached with the offending exporters to eliminate dumping. Unfortunately, our data does not allow us to separate the effects of a negative determination from an agreement among the parties which leads to withdrawal from the investigation. Prussa (1989) and Staiger and Wolak (1990) suggest that such withdrawals are the consequence of collusion between domestic and foreign firms. Although this is a definite possibility, this paper presents simpler model which is consistent with the institutional details.

Once a final determination has been reached, a firm that has caused material injury must pay a duty on all imports equal to the dumping or subsidy margin. A year after the final determination, the foreign exporter can request a review

of the case. If the review shows that the firm has stopped dumping or receiving a subsidy, then the dumping margin is revised to equal zero, but the order remains. If the foreign industry dumps the following year, a new dumping margin is assessed and duties are collected retroactively. Consequently, the foreign firm is essentially under the same penalty scheme once the duty is actually imposed as it was under the investigation.

In this model, domestic and foreign firms produce the same homogeneous product and engage in Cournot (quantity-setting) behavior. There are n domestic and n* foreign firms. Each domestic firm will maximize the following profit function:

$$(1)\quad p = P(Q)q - wq$$

Each domestic firm produces q, each foreign exporter sells q^*, and total US demand is given by $Q = nq + n^*q^*$. Total costs wq for domestic firms are equal to input costs w multiplied by output q. The technology for both domestic and foreign firms is constant returns to scale, with no fixed costs and constant marginal costs. This assumption is necessary for identification in the empirical section which follows.[5]

The foreign firm faces a slightly different maximization problem. We assume that the foreign firm sets its prices separately in its home market and the US market, and focus only on its export decision. To capture the uncertainty faced by a foreign firm under investigation for dumping or receiving subsidies, we construct the following expected profit function for its export sales:

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[5] See Bresnahan (1989) for a discussion of the identification problem in measuring market power.

(2) $E(p^*) = (1-g)[P(Q)]q^* + g[P(Q) - (F - P(Q))]q^* - ec^*q^*$

The probability of a duty is given by g. Expected profits are a weighted average of the firm's profit with and without duties. If there were no probability of a duty, then (2) would be the foreign counterpart of (1), with foreign costs converted into dollars by e, the exchange rate defined as dollars per unit of foreign currency. We will define foreign costs c^*e, in dollars, as w^*.

If the duty is imposed, the foreign firm will have to pay a per unit fine equal to the difference between the fair price F and the price it charges, P. F will always be greater than or equal to P, since the foreign firm has been accused of pricing too low in the US market. In a dumping case, the fair price is generally determined by the Department of Commerce, and defined as the difference between the foreign home market price and the exchange rate-adjusted import price. If sales in the foreign market are below cost, constructed cost estimates are found. Alternatively, under countervailing duties the difference F - P(Q) can also be interpreted as a specific duty equal to the amount of the subsidy the foreign firm receives.

It is also possible that firms would anticipate an investigation before it is formally announced. If so, then the impact of an investigation might be felt prior to its announcement. In the empirical section which follows, however, we test for this possibility and find no evidence of changed behavior prior to an investigation.

In a Cournot framework, firms choose quantities q and q*. Defining foreign costs ec^* (in dollars) as w^*, and differentiating (1) and (2) with respect to q and q* yields the first order conditions for profit maximization:

(3) $dp/dq = P'(dQ/dq)q + P - w = 0$

(4) $d(E(p^*))/dq^* = g\ P'(dQ/dq^*)q^* + P'(dQ/dq^*)q^* + P + (g\ P) - Fg - w^* = 0$

Multiplying (3) by n and (4) by n*, then adding the two equations, yields:

(5) $P'Q + (n + n^*)P = nw + [n^*\ F(g/g+1)] + [n^*\ w^*/(g+1)]$

Defining the inverse of the elasticity of demand $P'Q/P$ as $1/\epsilon$, this can be rewritten as

(5)' $P((1/\epsilon) + n + n^*) = nw + [n^*\ F(g/g+1)] + [n^*\ w^*/(g+1)]$

Recall that no optimizing firm in a one period maximization problem will price at less than marginal cost, so P is greater than or equal to w*. But F is greater than or equal to P by definition, so $F \geq w^*$. We will define F as equal to w*(M), where M is a mark-up over observed costs multiplied by the exchange rate. In the US case, F is usually adjusted to take into account changes in foreign costs (either due to changes in foreign-denominated costs or the exchange rate). Equation (5)' may then be rewritten as:

(6) $P\ [\ (1/\epsilon) + n + n^*] = nw + n^*w^*\ [\ \{\ gM + 1\ \}/(g+1)\ ]$

As long as the probability of duty is greater than 0 and the fair value F is greater than w*, the firm's mark-up will always rise under an investigation. This

may be seen by totally differentiating (6) and computing the total derivatives $(dP/dM)(M/P)$ and $(dP/dg)(g/P)$:

$$(7)\quad (dP/dM)(M/P) = \frac{n^*w^*(g/1+g)\ (M/P)}{(1/\epsilon) + n + n^* - (P/P')(\epsilon_Q/\epsilon^2)}$$

$$(8)\quad (dP/dg)(g/P) = \frac{\hat{}w^*(M-1)/(1+g)^2}{(1/\epsilon) + n + n^* - (P/P')(\epsilon_Q/\epsilon^2)}$$

The second order conditions for profit maximization imply that the denominators in (7) and (8) are positive. Both numerators are positive (recall that M is greater than or equal to 1) so both expressions are positive. Consequently, we would expect import prices to rise when either M or g increases. This could occur either under an investigation ($g > 0$ but < 1) or under a duty ($g = 1$). Clearly, the firm must increase its price to compensate for the probability of having to pay the (retroactive) duty. However, (7) and (8) show that the extent to which prices rise as M or g rise is also a function of the number of firms and the elasticity of demand. In general, an increase in M or g will not lead to a one-for-one increase in price, in part because foreign costs are only one component of price determination (the other is domestic costs). Incorporating non-constant costs will also change the pass-through coefficient on M and g. For example, if costs are declining then it is possible for changes in M or g to be magnified (see Feenstra (1989)).

One of the shortcomings of a one-period maximization problem is that firms must price greater than or equal to marginal cost in each period. Consequently, in this model the definition of dumping can only be taken to mean pricing below

what the firm sets in its home market. This is a standard definition of dumping: the sale of the same good at different prices in the home and export market. Although th definition of dumping has sometimes been extended to include sales below short run marginal cost, in our simple model this type of behavior is ignored.

This framework, which is consistent with institutional details, suggests that import prices should rise under an investigation. The impact of a duty on prices is also incorporated in the framework above: the only difference is that the probability g rises to 100 percent. This model also implies that prices are likely to rise more for products where the probability of a duty is higher. Although we cannot measure such probabilities ex ante, one ex post indication of higher probabilities is whether or not a duty was actually imposed. In our model, the price effect of an investigation is likely to be greater for those goods where the investigation ends in an affirmative decision and a duty is consequently imposed. This result contrasts with Prussa (1989) and Staiger and Wolak (1990), who suggest that prices should increase more (or decline less) for goods where duties are not imposed. In these models, successful collusion between exporters and domestic producers leads to a withdrawal of the investigation and increasing or stabilized import prices. The different outcomes predicted by the two models are tested using the empirical specification described below.

III. Empirical Specification and Data

The empirical specification is derived directly from the reduced form, equation (6). Rewriting (6) yields:

(9) $P\ [\ (1/\epsilon) + n + n^*] = n^*w^*\ [\ (nw/n^*w^*) + (gM + 1)/(g+1)\ ]$

Adding and subtracting 1 from the right-hand side, (9) may be rewritten as

(10) $P\ [\ (1/\epsilon) + n + n^*] = n^*w^*\ [\ (nw/n^*w^*) + g(M-1)/(g+1) + 1\ ]$

Taking logs and rearranging yields:

(11) LogP =

$$\log w^* + \log[(nw/n^*w^*) + g(M-1)/(g+1) + 1] + \log\ [n^*/((1/\epsilon) + n + n^*)]$$

The second term of the right-hand side may be rewritten using the approximation that the $\log(1 + x) = x$. The last term in equation (11) is the mark-up over marginal cost for a non-competitive firm. We will assume that this mark-up has a time varying component y_t as well as an industry-specific component f_i which is constant over time but varies across each ith industry. The industry effect will be incorporated using industry dummy variables, while time effects will be controlled for using time dummies for each quarter. Introducing subscripts i for the ith sector and t for the time period, (11) can be written as

(12) $\text{LogPit} = \log w^*_{it} + (n/n^*)(w/w^*)_{it} + g(M-1)/(g+1)_{it} + f_i + y_t$

The third term on the right hand side is the price increase arising from either an investigation ($g < 1$) or a duty ($g = 1$). This term will be denoted by a dummy variable INV or DUTY. The final estimating equation is given by

$$(13)\quad \text{Log}P_{it} = \alpha_1 \log w^*_{it} + \alpha_2 (w/w^*)_{it} + \alpha_3 INV_{it} + \alpha_4 DUTY_{it} + f_i + y_t$$

A number of implications arise from the reduced form (13). First, the coefficient on w* should be equal to 1. Second, the coefficient on w/w*, INV and DUTY should be positive. Third, the coefficient on DUTY should be greater than or equal to the coefficient on INV.

The supply relation (13) is identified using two key assumptions. First, we assume that the technology is characterized by constant marginal costs. The marginal cost curve, which is flat, only shifts if input prices or the exchange rate move, which is captured by w*. Second, we assume that changes in the number of firms or in the elasticity of demand may be captured by industry and time dummies. These assumptions together allow us to exclude quantity and income variables on the right hand side of (13). Quantity measures at the 4-digit SITC level were not available for imports to test the accuracy of the specification. One modification which could be desirable in future research would be to make either marginal costs or the demand elasticity explicitly a function of output indices. It is possible that omitting changes in output, which cannot be captured by industry or time effects, bias the results. For example, if increased output is associated with falling prices and higher likelihood of an investigation, then the coefficient on investigations will be biased downwards.

Data

Equation (13) is estimated using quarterly data for 1981-1986 for 41 industries. The price variable logP is taken from the BLS import price index series which calculates import price indices for industries at the 4-digit SITC

(Revision 2) level. The price series is calculated based on a survey of wholesale prices for imports in the United States. Since the BLS price indices control for quality changes, these indices are likely to be superior to unit price data, which may exhibit fluctuations due to changes in quality.

One of the dataset's limitations is that it does not specify the amount of the duty imposed. Consequently, we cannot estimate the amount which was passed on to the buyer. However, since the import price data are taken from wholesale buyers of imported products, the import price series should incorporate the price effects of the duties. Another potential estimation issue arises from specifying a duty or investigation as 0 or 1, which introduces a classic measurement error problem. As with all such problems, it is possible to show that this will lead to underestimating the true value of the coefficients on INV and DUTY. Consequently, these coefficients should be interpreted as a lower bound for measuring the effect of LFV cases on import prices.

Exchange rates were calculated using bilateral nominal rates weighted by 1980 trade volumes for each 4-digit SITC category. Foreign wholesale prices at the aggregate level, which we used as a measure of factor costs in foreign currency, were also calculated using 1980 trade weights and wholesale prices from the International Monetary Fund. Non-tariff barrier data is taken from UNCTAD, which collects data on non-tariff barriers for most developed countries. The United States NTB data was collected at the US tariff code (TSUSA) level and aggregated to the 4-digit SITC level using a concordance made available by the ITC. [6] Since the UNCTAD database only contains information on whether or not

[6] When several tariff categories were merged into one 4-digit SITC code, if one LFV case was associated with any one of the TSUSA categories then the SITC category was considered as subject to a LFV case. It can be shown that the measurement error which follows from this concordance leads to underestimating

an investigation or duty was applied, the variable NTB only takes on a value of 1 or 0. In future research efforts, the UNCTAD database could be replaced by a more comprehensive datas-t with additional information on the value of the preliminary dumping/subsidy margin or the value of the final duty imposed.

The 41 industry sample was selected by drawing only complete price series from the BLS import price series, which is available at the 4-digit level for selected SITC categories and selected years. For 1981-1986, a complete time series was available for 60 SITC groups. The frequency and types of non-tariff barriers across these categories are shown in Table 1. The frequency measure simply records the number of times a particular NTB appeared in the database, and reflects the number of countries affected as well as the number of different instances each measure was applied over 1981-1986.

Table 1 shows that quotas and voluntary export restraints were the most prevalent type of NTB applied. In next order of importance were investigations, which accounted for over 30 % of all non-tariff barrier cases. These were followed by duties, which represented 12 % of all NTBs. LFV cases represented an important type of non-tariff barrier for the sample industries.

To ensure that we would not confuse the effect of a countervailing or anti-dumping duty with other NTBs, all industries subject to any of the other types of non-tariff barriers were excluded from the sample. This reduced the sample from 60 to 45 industries. Most of the SITC categories eliminated were steel products, which have been subject to multiple NTBs (such as voluntary export restraints and trigger prices) in the 1980s. The sample was further reduced to 41 sectors, eliminating products with insufficient observations to provide a

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the impact of LFV cases.

Table 1

Frequency of Non-tariff barriers

1981-1986

Non-tariff barrier	Frequency	Percent
Tariff with quota	2	0.1
Seasonal Specific Tariffs	3	0.2
Investigations	656	36.1
Duties	226	12.5
Specific taxes	53	2.9
Quotas (including VRAs)	825	45.4
Price monitoring	4	0.2
Trigger price mechanism	3	0.6
Voluntary export price restraint	11	0.6
Multi-Fibre Agreement	23	1.3
Other	4	0.2

Source: UNCTAD database.

control group within each 1-digit SITC category. LFV cases were imposed on about half of the remaining 41 sectors over 1981-86. Since the time series runs from the first quarter of 1981 to the last quarter of 1986, the total number of observations is equal to 984.

Sample means for the dataset are listed in Table 2. The price, cost, and exchange rate indices were set at 100 for the first quarter of 1981, the beginning of the sample period. Table 2 shows that the mean import price was almost constant over the sample period, falling slightly below its beginning level. The exchange rate, denominated in dollars per unit of foreign currency, appreciated significantly. Import prices did not fall with the dollar's appreciation, but remained steady, which suggests that the pass-through of the exchange rate to prices was minimal. However, foreign costs (proxied by the

foreign wholesale price index) rose over the period, perhaps partly due to the depreciation of various currencies vis-a-vis the dollar. These increases in costs may have offset the fall in import prices expected under the dollar depreciation. The combined cost index, w^*, shows that the net impact of exchange rate and foreign cost changes was an overall fall in dollar-denominated foreign costs.

Table 2: Sample Means

Variable	Mean
Import Price	97.14
	(8.68)
Exchange Rate e	84.29
	(9.83)
Foreign Cost Index c*	111.90
	(9.67)
w*	93.69
	(8.27)
INV	0.12
	(0.33)
DUTY	0.15
	(0.36)
w/w*	1.12
	(.11)
N = 984	

The means for investigations INV and duties DUTY show the average proportion of sectors subject to investigations and duties over 1981-86. Investigations for subsidies or dumping were imposed for 13 percent of the sample. Duties were applied over 14 % of the sample.

IV. Results

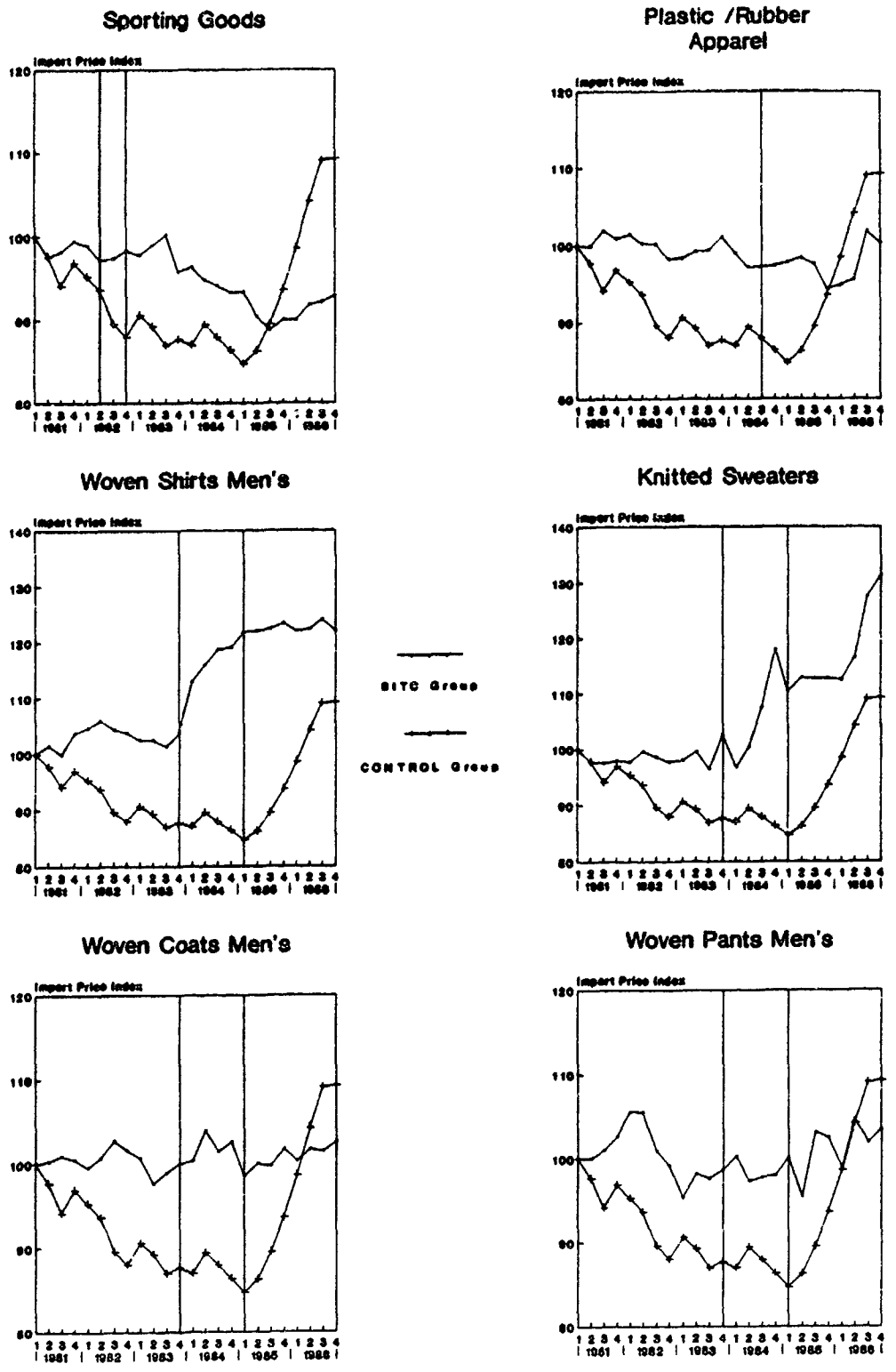
Figure 1 shows a separate plot for each of the 4-digit categories subject to either an investigation or duty. The import price for the affected sector is graphed against the price trend for a control group. The control group is calculated as the arithmetic average of import prices for all sectors within the same 1 digit SITC category not affected by non-tariff barriers. A control group is omitted only for "softwood lumber" due to lack of comparable sectors within the same 1-digit category. Softwood lumber is also excluded from the rest of the analysis but is included in the graphic presentation because the pricing response was so dramatic to the initiation of an investigation. The first vertical bar in the plots from Figure 1 signal the beginning of an investigation; if a duty was imposed, this is indicated by a second vertical bar.

The plots in figure 1 are striking in two respects. First, the plots show that on average import prices responded to the initiation of investigations. The most striking examples are softwood lumber, wood products, appliances for liquid flow control, men's shirts, and knitted sweaters. For both men's shirts and knitted sweaters, it appears that almost all of the price increase had already occurred by the time the duty was imposed. Second, import prices respond quite differently across sectors. In machinery (for example, roller bearings and motor vehicle parts) the impact of LFV cases seems much less significant than for garments (see, for example, men's shirts and knitted sweaters)

In other sectors where prices may not have actually increased under the investigation, the initiation of a LFV case seems to have prevented a decline in import prices either apparent in the earlier trend or in the behavior of the control group. This was the case for toys and games, sporting goods, plastic

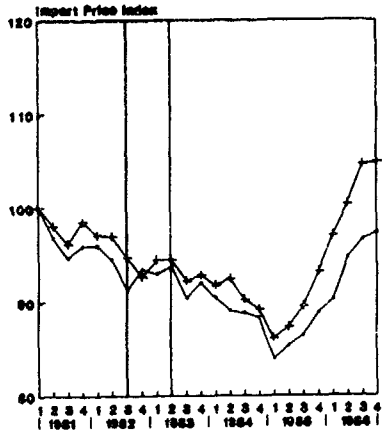
Figure 1

Impact of Investigations and Duties on Import Prices

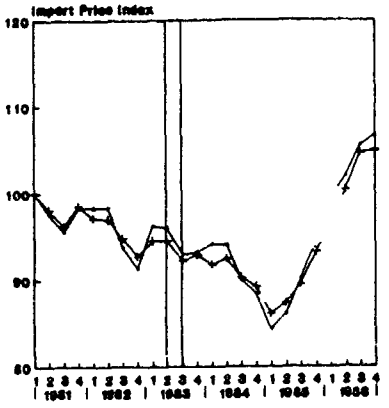


Impact of Investigations and Duties on Import Prices

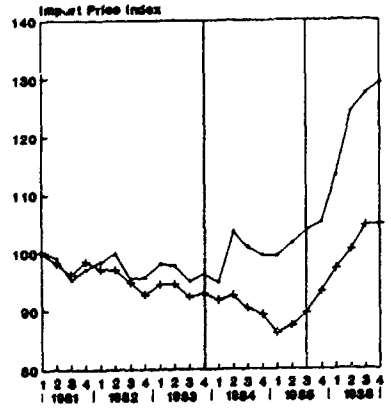
Electrical Machinery Misc.



Parts for Motor Vehicles



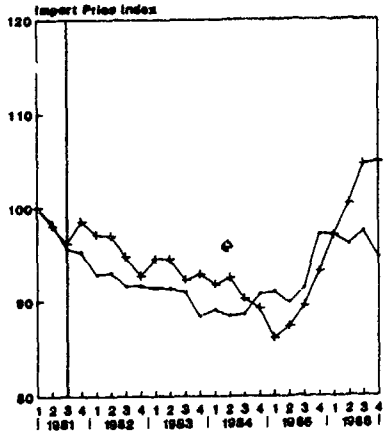
Appliances for Liquid Flow Control



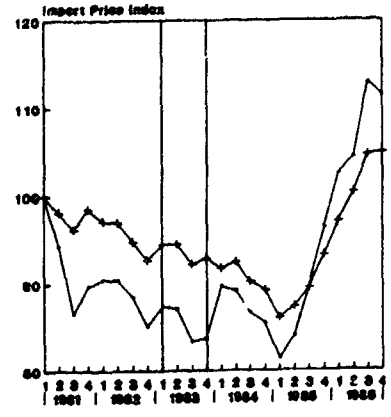
SITC Group

CONTROL Group

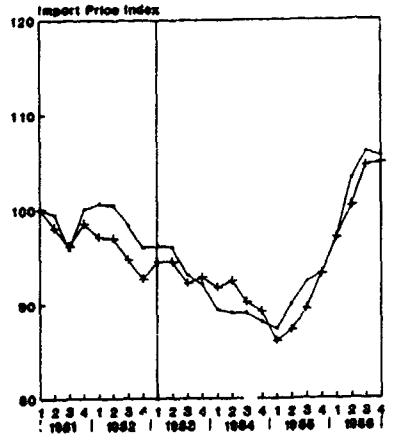
Batteries



Packaging non Elec. Machinery

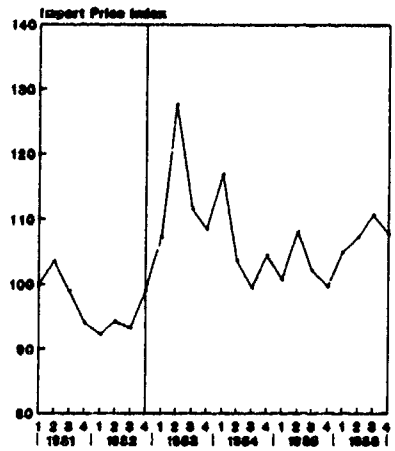


Roller Bearings

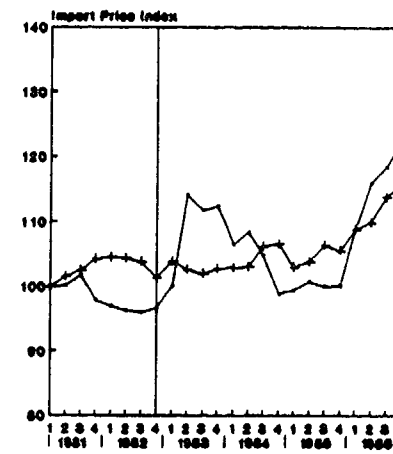


Impact of Investigations and Duties on Import Prices

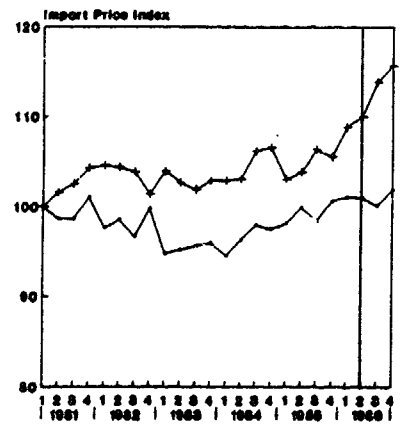
Softwood Lumber



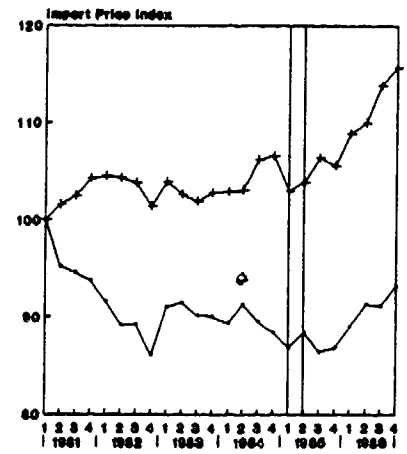
Wood Products



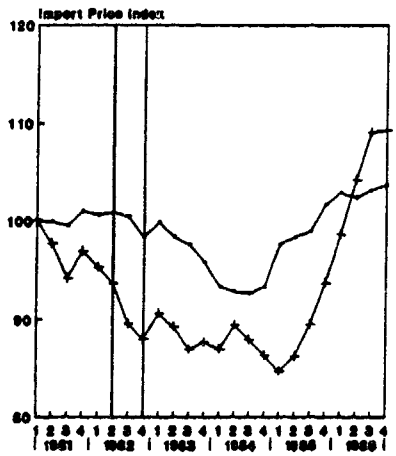
Locksmith's wares of Base Metals



Copper/Alloys Worked



Toys and Games



SITC Group

CONTROL Group

apparel, and packaging machinery.

Table 3 calculates the means of prices by commodity group before and during the investigations. We exclude the period following the investigation, since in a number of cases duties were consequently imposed. Prices generally rose under an investigation, although on average the price increase is quite small. However, when the change in prices is compared with price trends for a control group over the same period, the price increase appears more significant. [7] On average, import prices for the control group generally fell during the same period. The price changes following the investigations were compared to price changes for the control group and the mean difference in price movements for the two groups was compared using a t-test. The means test in Table 3 shows that the increase in prices under an investigation is statistically significant at the 5 percent level. The means presented above give preliminary evidence that an investigation does increase the import price of a product. In addition, comparisons with a control group suggest that the price increase is more significant when compared to general trends in the import price level.

The impact of duties on import prices is evaluated in Table 4. Excluding the periods under investigation, we compare pricing behavior with and without the duty. As indicated by the mean price changes for the control group, the overall price level was rising when most duties were actually in place. However, prices for goods with duties rose even higher, indicating a net positive impact of duties on import prices. The t-statistic for the difference in prices pre and post duty is significant at the 10 percent level.

Although the plots in Figure 1 and the means presented in Tables 3 and 4

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[7] Again, the control group includes all 4-digit SITC categories within the same 1-digit SITC category, averaged over the relevant time period before and during the investigation.

Table 3 Impact of Investigations on Import Prices: Industry Means

SITC	Description	Investigation			Control Group		
		Pre	Post	Dif	Pre	Post	Dif
2482	Softwood Lumber 1/	96.6	107.1	10.5	98.2	96.7	-1.5
6359	Wood Products	104.7	103.6	-1.1	105.3	102.6	-2.7
6822	Copper/Alloys, Worked	91.8	90.3	-1.6	102.8	103.0	0.2
6991	Locksmith's wares of base metal	98.0	101.0	3.1	103.8	113.2	9.4
7452	Packaging, weighing non-elec machinery	91.4	85.7	-5.7	97.4	93.5	-3.9
7491	Roller bearings	96.4	93.4	-3.0	95.2	93.2	-2.0
7492	Appliances for liquid flow control	97.4	98.2	0.8	95.9	92.4	-3.5
7781	Batteries	97.0	91.6	-5.4	100.0	93.0	-7.0
7788	Misc elec machinery	96.3	92.6	-3.8	97.8	94.1	-3.7
8421	Woven coats, men's	100.3	101.6	1.3	92.9	87.0	-5.9
8423	Woven pants, men's	100.5	98.4	-2.2	92.9	87.0	-4.0
8441	Woven shirts, men's	102.7	114.1	11.4	92.9	87.0	-4.0
8451	Knitted sweaters	98.2	105.0	6.8	92.9	87.0	-4.0
8482	Plastic/Rubber apparel	99.1	97.7	-1.3	94.5	86.3	-8.2
8942	Toys and games	100.2	100.6	0.4	96.8	91.6	-5.2
8947	Sporting goods	98.9	97.3	-1.6	96.8	91.6	-5.2
Sample Mean		97.6	98.6	1.0	97.3	93.7	-3.6
T-Test of Difference in Means		Difference		4.1			
		T-value		2.7			

1/ Since no other products available in SITC 2, all products used as control.

Table 4

Impact of Duties on Import Prices:

Industry Means

SITC	Description	Duty			Control Group		
		Pre	Post	Dif	Pre	Post	Dif
6861	Zinc and alloys	95.9	104.1	8.2	108.4	103.3	-5.1
7452	Packaging, weighing non-elec machinery	91.4	94.4	3.0	97.4	93.9	-3.5
7492	Appliances for liquid flow control	97.4	111.4	14.0	95.9	94.7	-1.2
7722	Printed circuit boards	94.2	98.2	4.0	94.3	98.1	3.8
7788	Misc electric machinery	96.3	90.2	-6.1	97.8	93.7	-4.1
8421	Woven coats, men's	100.3	101.2	0.9	92.9	100.7	7.8
8423	Woven pants, men's	100.5	102.4	1.9	92.9	100.7	7.8
8441	Woven shirts, men's	102.7	122.7	20.1	92.9	100.7	7.8
8451	Knitted sweaters	98.2	119.0	20.8	92.9	100.7	7.8
8942	Toys and games	100.2	98.1	-2.1	96.8	92.9	-3.9
8947	Sporting goods	98.9	93.8	-5.1	96.8	92.9	-3.9
Sample Mean		97.2	103.5	6.3	96.3	97.5	1.2
T-Test of Difference in Means		Difference		4.2			
		T-value		1.7			

suggest that both investigations and duties have a significant effect on import prices, these exercises cannot control for other factors such as exchange rate and cost changes. The remainder of this paper tests the effects of LFV cases using a number of alternative empirical specifications. We begin with a simple OLS specification, controlling for industry-specific effects. Since exchange rate and cost changes may only be gradually passed on to import prices, we then introduce lagged price on the right-hand side. Finally, we consider the possibility of sample selection bias. Since LFV cases may occur in specific types of sectors, such as those experiencing rapid price declines prior to investigations, it is important to test for the impact of selection bias on the estimated coefficients.

Table 5 presents OLS estimates for equation (13) using a fixed effect specification. Dummy variables are included to control for industry effects. Since the earlier plots and tables suggested that behavior may differ across different sectors, we divide the sample into three groups and estimate the coefficients separately for SITC 6 (intermediate manufactures), SITC 7 (machinery), and SITC 8 (other manufactures). Time dummies were included for each of the 24 quarters but the coefficients are not reported here.

Three different specifications are included for each sector. Since there is likely to be multicollinearity between logw* and the relative cost variable w/w*, specifications (1) and (2) exclude w/w*. We also allow the coefficient on INV to differ depending on whether the outcome is affirmative (a duty is imposed) or negative (no duty). The model presented earlier suggested that the price effect of investigations should vary as the probability of a duty changed. Consequently, if firms have prior knowledge on the likelihood of a duty (as proxied here by the ex post outcome) this should affect the impact of an

investigation.

For all three manufacturing groups, duties lead to a statistically significant increase in import prices, ranging from 4 to 9 percent. However, the impact of investigations varies significantly across the three sectors. Investigations have no impact on prices for machinery imports (SITC 7), but statistically significant and opposite effects in SITC 6 (intermediates) and 8 (textiles).

When the impact of an investigation is separately estimated depending on whether the investigation is followed by a duty, several interesting results emerge. For intermediates (SITC 6), investigations have no impact on import prices unless they end in a duty: when a duty follows, investigations are accompanied by (on average) 13 percent price declines. For SITC 7, neither investigations nor duties have a statistically significant impact on prices. For SITC 8, however, the impact of an investigation is greatest for investigations culminating in duties, indicating that the expected duty is incorporated in pricing behavior before the duty is actually imposed. Investigations resulting in a duty have a positive price effect roughly equivalent to the duty itself, raising prices in the 4-digit SITC category by about 6 %. Investigations resulting in no action also lead to price increases, but the magnitude of the increase is smaller.

The behavior of sectors within SITC 8 provides support for the model presented earlier, which suggested that both investigations and duties would be accompanied by price increases. The model also suggested that price increases during an investigation would be highest where the likelihood of duties was also greatest. In Table 6, investigations which culminated in duties also had the greatest positive impact on prices for SITC 8. However, the evidence for

Table 5

OLS ESTIMATES OF IMPORT PRICE EQUATION
INCLUDING FIXED EFFECTS

Dependent variable: Log P

	SITC 6			SITC 7			SITC 8		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Intercept	3.306	3.387	-5.881	2.287	2.290	-4.132	2.613	2.607	-9.151
	(.440)	(.429)	(4.050)	(.250)	(.251)	(1.874)	(.289)	(.289)	(3.269)
Investigation	-.058	-	-	-.001	-	-	.055	-	-
	(.021)			(.010)			(.010)		
Duty	.050	.085	.078	.038	.038	.039	.053	.053	.056
	(.020)	(.022)	(.023)	(.008)	(.009)	(.008)	(.011)	(.011)	(.011)
Investigation (Duty)	-	-.138	-.126	-	-.005	-.003	-	.058	.062
		(.032)	(.033)		(.013)	(.013)		(.011)	(.011)
Investigation (No duty)	-	-.006	0.000	-	.003	.002	-	.029	.045
		(.026)	(.026)		(.014)	(.014)		(.027)	(.027)
Log w*	.283	.263	1.958	.512	.511	1.679	.438	.439	2.580
		(.091)	(.734)	(.054)	(.054)	(.341)	(.063)	(.063)	(.596)
W/w*			1.478			1.040			1.911
			(.661)			(.304)			(.521)
R^2	.58	.60	.58	.74	.74	.74	.74	.74	
N	192	192	192	480	480	480	312	312	

Note: All equations include quarterly time dummies.

intermediate manufactures (SITC 6) seems to provide more support for the models developed by Prussa (1988) and Staiger and Wolak (1990). For intermediates, prices only fell when investigations were followed by duties, while prices were maintained when the investigation failed to culminate in the imposition of a duty. As suggested by Prussa's (1988) theoretical model, it appears that importers which fail to curb price declines are "punished" with duties, while those which stabilize price levels are rewarded by zero duties. The types of products subject to LFV cases in SITC 6, such as metal and wood products, typically have a more concentrated market structure than those in SITC 8 (primarily garments). Since price collusion is likely to be easier in concentrated markets, it is not surprising that intermediates provide more support for the theoretical framework suggested in Prussa (1988), while garment exporters seem to follow more closely the noncooperative framework in this paper.

One of the implications of the model is that the coefficient on foreign costs (in dollar terms) should be equal to unity. When w/w* is excluded from the equation, the coefficient on log w* is significantly lower than unity, while if w/w* is included, the estimates on log w* range from 1.7 to 2.6. It is likely that inclusion of w/w* makes it difficult to estimate the coefficient on log w* precisely due to multicollinearity between the two variables. Although including w/w* or excluding it has no impact on the other variables of interest, it is disturbing that the estimate on log w* is so low when w/w* is excluded. One possible explanation for this low value is that we are not accounting for lagged effects. Exchange rate and cost changes may only slowly translate into changes in import prices, possibly due to contracts which make price adjustments sticky.

Table 6 re-estimates the import price equation under the assumption of a geometrically declining lag on all the right-hand side independent variables.

Table 6

ALTERNATIVE SPECIFICATION ALLOWING
FOR ADJUSTMENT LAGS

Dependent variable: Log P

				Implied long run coefficients		
	SITC 6	SITC 7	SITC 8	SITC 6	SITC 7	SITC 8
Intercept	1.141 (.370)	-.147 (.153)	-.002 (.184)	-	-	-
Lag P	.711 (.056)	.876 (.027)	.848 (.033)	-	-	-
Investigation (Duty)	-.040 (.024)	.004 (.007)	.014 (.006)	-.140	.031	.095
Investigation (No duty)	.008 (.018)	.003 (.008)	.009 (.014)	.027	.027	.061
Duty	.034 (.016)	.009 (.005)	-.011 (.006)	.118	.075	-.072
Log w*	.044 (.071)	.155 (.032)	.152 (.036)	.152	1.252	0.998
F-Test (a)	9.5	0.9	0.0	-	-	-
R^2	.85	.94	.93	-	-	-
N	184	460	299	-	-	-

Standard errors in ().

Dummy variables included for each four-digit SITC code to control for industry fixed effects. All equations also include quarterly time dummies.

(a) F - value for the test that the long run coefficient on Log w* = 1.

Including the lagged import price on the right-hand side is equivalent to including lags on all the independent variables. The long-run coefficient on the exogenous variables is then equal to the estimated coefficient divided by 1 minus the coefficient on lagged price. (An alternative specification would be to explicitly include lagged values for selected variables and add the values to derive a long run value). Table 6 shows that the long run coefficient for w* is not statistically different from unity for all sectors in SITC 7 and 8. This suggests that the model specification is supported for those sectors, but at the same time indicates that the results in SITC 6 should be interpreted with caution.

Another potential bias from estimating (13) lies in the fact that investigations and duties may not be an exogenous event. Salvatore (1987) suggests that investigations (and duties) are more likely to be initiated when import penetration is high, while others have argued that rising protection in the early 1980s was related the significant appreciation of the US dollar. If investigations and duties are in fact endogeneous with respect to imports or exchange rate changes, then the previous estimates may be biased. If the likelihood of an investigation is greater when import penetration is high, import prices are low, or the exchange rate is appreciating, then earlier estimates of the price effects of LFV cases will be biased downwards.

We first test for the presence of selection bias by creating a dummy variable which equals 1 if an investigation will occur one, two, or three quarters later. The coefficient on the dummy variable should be zero if there is no selection bias. If there is an endogeneity problem, the value of the dummy variable could be positive, suggesting that suppliers know the government watching. Alternatively, it could show up negative if falling import prices

Table 7

TESTING FOR SAMPLE SELECTION BIAS

Dependent variable: Log P

	SITC 6		SITC 7		SITC 8	
	(1)	(2)	(1)	(2)	(1)	(2)
Lead 1 Inv.	-.001	-	-.019	-	.017	-
	(.044)		(.042)		(.050)	
Lead 2 Inv.	.023	-	-.021	-	.019	-
	(.044)		(.042)		(.050)	
Lead 3 Inv.	.005	.003	-.020	-.018	.026	.024
	(.045)	(.044)	(.042)	(.041)	(.050)	(.050)
Investigation (Duty)	-.135	-.138	-.006	-.005	.058	.058
	(.034)	(.033)	(.013)	(.013)	(.011)	(.011)
Investigation (No duty)	-.006	-.006	.003	.003	.029	.029
	(.026)	(.026)	(.014)	(.014)	(.027)	(.027)
Duty	.085	.085	.036	.037	.054	0.053
	(.022)	(.022)	(.009)	(.009)	(.011)	(.011)
Log w*	.267	.264	.512	.511	.436	.438
	(.092)	(.092)	(.055)	(.055)	(.063)	(.063)
R^2	.59	.60	.74	.74	.73	.74
N	192	192	480	480	312	312

All equations include time and industry dummies.
Intercept term included but not reported.
Lead 1 Inv. = dummy variable equal to 1 for one quarter before investigation begins.
Lead 2 Inv. = dummy variable equal to 1 for two quarters before investigation begins.
Lead 3 Inv. = dummy variable equal to 1 for three quarters before investigation begins.

trigger an investigation. The results for this exercise are presented in Table 7. The dummy variables which test for sample selection bias are all statistically insignificant, which suggests that the bias due to sample selection is not important. The results in Table 7 provide support for the appropriateness of the control group; if differences existed between the two groups, these should be reflected in the coefficients on the dummies preceding the investigations.

Despite the evidence presented in Table 7 that sample selection bias is probably not a serious problem for the estimation procedure, we nevertheless estimated (13) taking into account the potential endogeneity of duties and investigations. Table 8 presents the results from two-stage least squares of estimation of (13). Investigations and duties are estimated in the first stage using as instruments lagged changes in price and foreign costs $\log w^*$, the lagged share of the 4-digit sector in total US imports, and the other right-hand side exogenous variables in the equation. One limitation, however, was that the available instruments did not allow us to estimate with precision the price effects of investigations which resulted in duties from others which did not. Consequently, only the simpler specification (with just one variable for investigations) is presented in Table 8. The predicted values from the linear probability model are then used in the second stage. This procedure is simpler than using a Heckman two-stage sample selection procedure. Such an approach was employed in an earlier version of this paper and did not yield different results than two stage least squares.

Table 8 yields qualitatively similar results to the OLS specifications presented earlier, although some interesting differences emerge. The impact of duties is statistically insignificant for SITCs 7 and 8, but increases in magnitude for SITC 6. For intermediates, the two-stage results suggest that

Table 8

INSTRUMENTAL VARIABLE ESTIMATES a/

Dependent variable: Log P

	SITC 6	SITC 7	SITC 8
Intercept	4.056 (.958)	1.541 (.142)	3.701 (.856)
Investigation b/	-.484 (.260)	-.075 (.034)	.191 (.088)
Duty b/	.353 (.180)	-.012 (.017)	.030 (.038)
Log w*	.129 (.203)	.673 (.031)	.195 (.190)
R^2	.33	.66	.61
N	192	480	312

a/ All equations include time and intercept dummies.
b/ Instruments include lagged changes in price and Log w*, lrelw, the lagged share of the sector in total imports, log w*, and time and industry dummies.

prices rose by 35 % with the imposition of a duty. For all three groups of manufactures, the impact of investigations is statistically significant. For SITCs 6 and 7, investigations are associated with statistically significant price declines, while for SITC 8 the price effect is positive, suggesting a 19 % price increase under investigations.

Conclusion

This paper measures the impact of anti-dumping and countervailing investigations and duties on import prices in the United States over 1981-86. Our results suggest that import prices increased by as much as 10 percent for some manufacturing sectors (such as garments) during an investigation. This confirms that these measures do exert a significant protective effect through import prices, even apart from the actual imposition of duties. The panel nature of the dataset makes it possible to control both for industry effects and general trends in import prices, as well as obtain separate estimates of the price impact of investigations and duties.

The results also suggest that investigations followed by duties have different effects than those resulting in no action. For all three groups of manufacturing sectors studied in the paper, investigations ending in no duty had almost no impact on import prices. However, investigations followed by duties were accompanied by either significant price increases (as in textiles) or declines. For intermediate goods, investigations which ended in duties were accompanied by price declines as high as 15 %. These different results suggest that the price dynamics across industries is likely to vary significantly. For textiles, retroactive duties appear to have been anticipated during the

investigation and incorporated in pricing behavior. For the other sectors, including intermediates and machinery, duties appear to follow as a punishment for a fall in import prices.

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